Amendment to the Specification

At Page 1, line 1, is to be deleted.

At Page 1, line 3, a new paragraph entitled "Cross References to Related Applications" is to be added, just below the Title, as follows:

The present application is a continuation of US Application Serial No. 09/607,843 filed on June 30, 2000.

The Paragraph beginning at Page 1, lines 13-36, through to Page 2, lines 1-15, is to be amended as follows:

Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention on June 30, 2000:

6824044 6678499 6679420 6963845 6976220 6976035
6766942 6995859 6720985 09/609303 6922779 6978019
6847883 09/607843 6959298 6973450 09/609553 6965882
09/608022 7007851 6957921 6457883 6831682 6977751
6398332 6394573 6622923

~~09/609,139, 09/608,970, 09/609,039, 09/663,579,~~
~~09/663,599, 09/607,852, 09/607,656, 09/609,132,~~
~~09/663,701, 09/663,640, 09/609,303, 09/610,095,~~
~~09/609,596, 09/693,705, 09/607,843, 09/607,605,~~
~~09/608,178, 09/609,553, 09/609,233, 09/609,149,~~
~~09/608,022, 09/609,232, 09/607,844, 6,457,883,~~
~~09/608,920, 09/607,985, 6,398,332, 6,394,573,~~
~~09/606,999~~

The disclosures of these co-pending applications are incorporated herein by cross-reference.

Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention on 23 May 2000:

6428133 6526658 6315399 6338548 6540319 6328431
6328425 6991320 6383833 6464332 6390591 7018016
6328417 09/575197 7079712 09/575123 6825945 09/575165
6813039 6987506 7038797 6980318 6816274 7102772

09/575186	6681045	6728000	09/575145	7088459	09/575181
7068382	7062651	6789194	6789191	6644642	6502614
6622999	6669385	6549935	6987573	6727996	6591884
6439706	6760119	09/575198	6290349	6428155	6785016
6870966	6822639	6737591	7055739	09/575129	6830196
6832717	6957768	09/575162	09/575172	09/575170	7106888
7123239	6409323	6281912	6604810	6318920	6488422
6795215	09/575109	6859289			

~~09/575,197,~~	~~09/575,195,~~	~~09/575,159,~~	~~09/575,132,~~
~~09/575,123,~~	~~09/575,148,~~	~~09/575,130,~~	~~09/575,165,~~
~~09/575,153,~~	~~09/575,118,~~	~~09/575,131,~~	~~09/575,116,~~
~~09/575,144,~~	~~09/575,139,~~		~~09/575,186, 09/575,185,~~
~~09/575,191,~~	~~09/575,145,~~	~~09/575,192,~~	~~09/575,181,~~
~~09/575,193,~~	~~09/575,156,~~	~~09/575,183,~~	~~09/575,160,~~
~~09/575,150,~~	~~09/575,169,~~	~~09/575,184,~~	~~6,502,614,~~
~~09/575,180,~~	~~09/575,149,~~	~~6,549,935,~~	~~09/575,187,~~
~~09/575,155,~~	~~6,591,884,~~	~~6,439,706,~~	~~09/575,196,~~
~~09/575,198,~~	~~09/575,178,~~	~~6,428,155,~~	~~09/575,146,~~
~~09/575,174,~~	~~09/575,163,~~	~~09/575,168,~~	~~09/575,154,~~
~~09/575,129,~~	~~09/575,124,~~	~~09/575,188,~~	~~09/575,189,~~
~~09/575,162,~~	~~09/575,172,~~	~~09/575,170,~~	~~09/575,171,~~
~~09/575,161,~~	~~6,428,133,~~	~~6,526,658,~~	~~6,315,399,~~
~~6,338,548,~~	~~6,540,319,~~	~~6,328,431,~~	~~6,328,425,~~
~~09/575,127,~~	~~6,383,833,~~	~~6,464,332,~~	~~6,390,591,~~
~~09/575,152,~~	~~6,328,417,~~	~~6,409,323,~~	~~09/575,114~~
~~6,604,810,~~	~~6,318,920,~~	~~6,488,422,~~	~~09/575,108,~~
~~09/575,109~~	~~09/575,110~~		

The disclosures of these co-pending applications are incorporated herein by cross-reference.

The Paragraph beginning at Page 17, lines 21-25, is to be amended as follows:

The physical representation of the tag, shown in Figure 5, includes fixed target structures (15, 16~~,~~ and 17) and variable data areas (18a-18d). The fixed target structures allow a sensing device such as the netpage pen to detect the tag and infer its three-dimensional orientation relative to the sensor. The data areas contain representations of the individual bits of the encoded tag data.

The Paragraph beginning at Page 19, lines 13-32, through to Page 20, lines 1-8, is to be amended as follows:

The ring target structure (15) (see Fig. 5) is the first to be located (at 26). A ring has the advantage of being very well behaved when perspective-distorted. Matching proceeds by aspect-normalizing and rotation-normalizing each shape's moments. Once its second-order moments are normalized the ring is easy to recognize even if the perspective distortion was significant. The ring's original aspect and rotation 27 together provide a useful approximation of the perspective transform.

The axis target structure (16) (see Fig. 5) is the next to be located (at 28). Matching proceeds by applying the ring's normalizations to each shape's moments, and rotation-normalizing the resulting moments. Once its second-order moments are normalized the axis target is easily recognized. Note that one third order moment is required to disambiguate the two possible orientations of the axis. The shape is deliberately skewed to one side to make this possible. Note also that it is only possible to rotation-normalize the axis target after it has had the ring's normalizations applied, since the perspective distortion can hide the axis target's axis. The axis target's original rotation provides a useful approximation of the tag's rotation due to pen yaw 29.

The four perspective target structures (17) (see Fig. 5) are the last to be located (at 30). Good estimates of their positions are computed based on their known spatial relationships to the ring and axis targets, the aspect and rotation of the ring, and the rotation of the axis. Matching proceeds by applying the ring's normalizations to each shape's moments. Once their second-order moments are normalized the circular perspective targets are easy to recognize, and the target closest to each estimated position is taken as a match. The original centroids of the four perspective targets are then taken to be the perspective-distorted corners 31 of a square of known size in tag space, and an eight-degree-of-freedom perspective transform 33 is inferred (at 32) based on solving the well-understood equations relating the four tag-space and image-space point pairs (see Heckbert, P., Fundamentals of Texture Mapping and Image Warping, Masters Thesis, Dept. of EECS, U. of California at Berkeley, Technical Report No. UCB/CSD 89/516, June 1989, the contents of which are herein incorporated by cross-reference).